

## WHAT IS CLAIMED IS:

1. A method of guiding the placement or observing the operation of an invasive medical device (30) comprising:
  - 5 operating an invasive medical device (30) from an invasive medical device system to perform an activity within a body;
  - operating an ultrasonic diagnostic imaging system to guide or observe the invasive medical device (30) by means of a three dimensional ultrasonic image;
  - producing information with the invasive medical device system having
  - 10 coordinate information relating to the activity; and
  - merging information from the invasive medical device system into the three dimensional ultrasonic image at a location in the ultrasonic image data which is determined from the coordinate information.
- 15 2. The method of Claim 1, wherein the invasive medical device (30) includes a position sensor (32); and  
wherein producing information with the invasive medical device system comprises producing coordinate information in response to signals received from the position sensor (32).
- 20 3. The method of Claim 2, wherein the position sensor (32) comprises a receiver which receives signals in the acoustic, optical radio frequency, or electromagnetic spectrum.
- 25 4. The method of Claim 2, wherein the position sensor (32) comprises a transmitter which transmits signals in the acoustic, optical, radio frequency, or electromagnetic spectrum.
- 30 5. The method of Claim 1, wherein merging information further comprises merging locational information into the three dimensional ultrasonic image at locations where activity of the invasive medical device (30) has been performed.

6. The method of Claim 1, wherein operating an ultrasonic diagnostic imaging system further comprises processing ultrasonic echo information to produce a three dimensional wire frame model (130) of a volumetric region (120) of the body.

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7. The method of Claim 6, wherein merging information further comprises merging locational information into the three dimensional wire frame model (130) at locations where activity of the invasive medical device (30) has been performed.

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8. The method of Claim 6, wherein operating an ultrasonic diagnostic imaging system further comprises processing ultrasonic echo information to produce a volume rendered ultrasonic image; and

further comprising displaying both the volume rendered ultrasonic image  
15 and the three dimensional wire frame model (130).

9. The method of Claim 8, wherein merging information further comprises merging locational information into at least one of the three dimensional wire frame model (130) and the volume rendered ultrasonic image at locations where activity  
20 of the invasive medical device (30) has been performed.

10. The method of Claim 1, further comprising acquiring ECG data; and further comprising displaying both the three dimensional ultrasonic image containing merged information from the invasive medical device system (30) and an  
25 ECG trace.

11. The method of Claim 10, wherein merging information further comprises merging locational information into the three dimensional ultrasonic image at locations where activity of the invasive medical device (30) has been performed; and  
30 wherein displaying further comprises displaying a plurality of ECG traces related to the locations where the activity of the invasive medical device (30) has been performed.

12. The method of Claim 11, wherein operating an ultrasonic diagnostic imaging system further comprises producing a volume rendered three dimensional anatomical ultrasonic image.

5 13. The method of Claim 11, wherein operating an ultrasonic diagnostic imaging system further comprises producing a three dimensional wire frame model (130) of an anatomical region of the body.

10 14. A method of guiding the placement or observing the operation of an invasive medical device (30) with a three dimensional ultrasonic imaging and invasive medical device operating system comprising:

operating an invasive medical device (30) by means of an interventional device subsystem (20) to perform an activity within a body;

15 acquiring ultrasonic echo information by means of an ultrasonic imaging subsystem (12) from a volumetric region (120) containing the invasive medical device (30);

producing information from the invasive medical device (30) having coordinate information relating to the activity;

20 producing a real time three dimensional ultrasonic image with spatially coordinated invasive medical device activity information from the ultrasonic echo information and the information from the invasive medical device (30); and

displaying the real time three dimensional ultrasonic image with spatially coordinated invasive medical device activity information on an image display (18).

25 15. An ultrasonic surgical guidance imaging system which acts to guide the placement or observe the operation of an invasive medical device (30) comprising:

an ultrasonic probe (10) including an array transducer which steers ultrasonic beams over a volumetric region (120) for image guidance of the placement or  
30 operation of an invasive medical device (30);

an ultrasound acquisition subsystem (12) coupled to the ultrasonic probe (10);

an invasive medical device (30);  
an interventional device subsystem (20) coupled to the invasive medical device (30);

a 3D image processor (14) coupled to the ultrasound acquisition  
5 subsystem (12) and the interventional device subsystem (20); and  
an image display (18) coupled to the 3D image processor (14).

16. The ultrasonic surgical guidance imaging system of Claim 15,  
wherein the invasive medical device (30) further includes a position sensor (32); and  
10 wherein the interventional device subsystem (20) further includes a device position  
measurement subsystem (24) coupled to the position sensor.

17. The ultrasonic surgical guidance imaging system of Claim 16,  
wherein the 3D image processor (14) is further responsive to locational signals  
15 produced by the device position measurement subsystem (24).

18. The method of Claim 1, further comprising acquiring parametric  
data; and further comprising displaying both the three dimensional ultrasonic image  
20 containing merged information from the invasive medical device system and a  
parametric image.

19. The method of Claim 18, wherein the parametric image is formed  
of at least one of ECG/electrical signals, tissue Doppler signals, strain rate signals,  
25 thickening measurements, or regional motion.